

NBSIR 75-689

The Shirley Highway Express Bus-on-Freeway Demonstration Project/A Study of Park-and-Riding

James T. McQueen and Gerald K. Miller with Carol Harrison

National Bureau of Standards
Technical Analysis Division
Urban Systems Program Area
Washington, D. C. 20234

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Interim Report 6

Prepared for
**Urban Mass Transportation Administration
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U.S. DEPARTMENT OF COMMERCE, Rogers C.B. Morton, Secretary
NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director

Preface

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Mr. Theodore H. Saks and Mr. David M. Levinsohn of the Technical Analysis Division for their assistance in processing the survey data;

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ABSTRACT

The market for fixed route transit operations is not limited to travelers within walking distance of transit stops. This was demonstrated by the Shirley Highway Express-Bus-on-Freeway Project, as project promoted park-and-ride operations led to sizable increases in bus patronage. Park-and-riders, commuters who traveled by auto to a bus stop and then by bus to work, greatly expanded the market for the fixed route bus service in the Shirley Highway Corridor area.

This report presents results of a study of the successful park-and-ride operation within the Shirley Highway Corridor area: suburban fringe parking lots coupled with the high speed buses of the Shirley Highway Express-Bus-on-Freeway Project. Demographic characteristics of the park-and-riders as well as characteristics of their present park-and-ride and previous commute trips are examined. Factors important in the commuters' decisions to park-and-ride are identified. The report also describes the survey procedures used in the study.

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1. INTRODUCTION

1.1 BACKGROUND

As traffic congestion and the demand for parking in the downtown sections of many large metropolitan areas have increased in recent years, alternatives to auto commuting to and from work have become more popular. Much of this increased demand for alternatives to the auto has come from low density suburban areas with limited public transit service. This has led to an increase in the demand for transit trips for which an auto is used to travel to the transit stop. Trips where a commuter drives or is driven by someone else to the transit stop are called park-and-ride trips. (Commuters who park-and-ride will be referred to as park-and-riders.) Park-and-ride trips include parking in fringe parking lots which have been officially developed as park-and-ride lots, as well as trips by commuters casually parking on residential streets. After parking, these commuters board transit vehicles which proceed to destinations in downtown areas and other employment centers.

One of the major project elements of the Shirley Highway Express-Bus-on-Freeway Demonstration Project is residential fringe parking coordinated with new transit service on the exclusive bus lanes. These well planned park-and-ride facilities provide geographic flexibility for the transit operator by extending the market area of the bus system. Service at the lots can also increase operating efficiency by minimizing the slower collection portion of the trip.

Park-and-riders comprise an important portion (about 25 percent) of bus commuters traveling within the Shirley Highway Corridor. Figure 1 indicates the area of influence of the bus-on-freeway project and the relative locations of the major park-and-ride lots. The lined area depicts the primary service area of the project routes. After the auto access trip, these commuters board express buses which travel over the exclusive lanes to destinations in downtown Washington, D.C., the Pentagon or Crystal City, Virginia. The performance of park-and-ride at the major lots within the Corridor and the commuters using it are the subject of this report.

1.2 PURPOSE OF REPORT

A major objective of the Shirley Highway Express-Bus-on-Freeway Demonstration Project is to learn more about the factors which determine a commuter's choice of transportation to and from work.¹ Some knowledge exists of factors which influence a commuter's decision to park-and-ride rather than use some other mode to travel to and from work.² The primary purpose of this report is to determine the factors which have been found to influence Shirley Highway Corridor commuters' mode choice decisions when park-and-ride is developed as an element in a comprehensive transit service improvement using exclusive bus lanes. It is hoped that this experience will be of use to transportation planners in the design of strategies to meet the growing demand for commuter transit service from distant suburban communities.

¹See "The Shirley Highway Express-Bus-on-Freeway Demonstration Project/Second Year Results. Interim Report 4" (Report UMTA/DOT4), November 1973. Available from NTIS, Springfield, Virginia, COM-74-10, \$4.00.

²See "Locating and Operating Bus Rapid Transit Park-and-Ride Lot," D.M. Gatens, Transportation Research Record 505, 1974; Transportation Research Board, Washington, D.C., 1974.

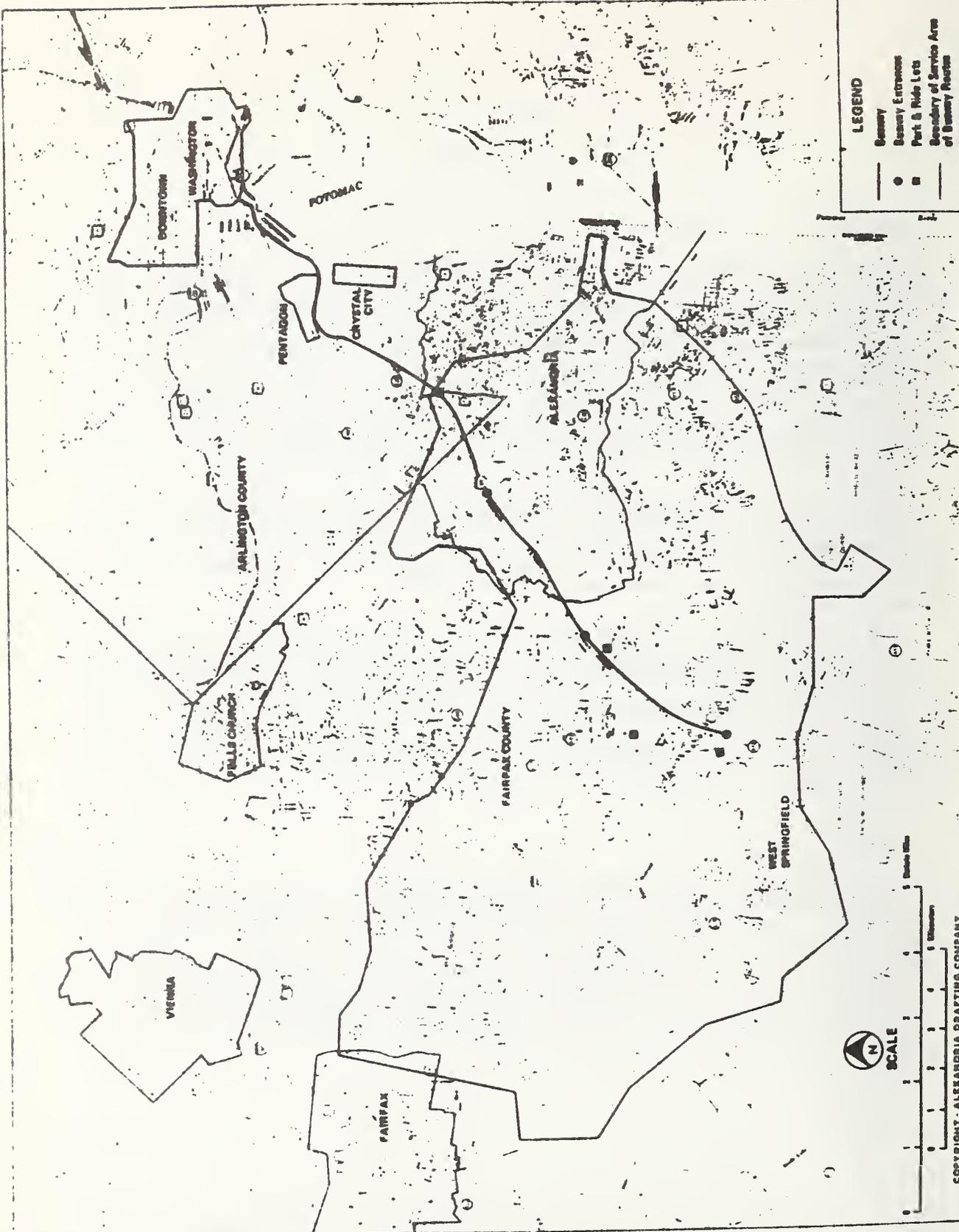


Figure 1. Shirley Highway Express Bus Service Area

1.3 SCOPE OF REPORT

This report covers peak period park-and-ride operations in the Shirley Highway Corridor between 1971 and 1973. Objectives are to:

- 1) Document park-and-ride performance in attracting Corridor auto commuters and describe the park-and-riders.
- 2) Examine the factors which have influenced commuting motorists to switch to the Corridor park-and-ride service.

Data from three commuter surveys have been used in this study: 1) a major study of all Corridor auto and bus commuters (including park-and-riders) in October 1971; 2) a survey of bus commuters boarding at the major park-and-ride lots (Backlick and Springfield Plaza) in February and March 1973; and 3) a survey of all Corridor bus commuters (including park-and-riders) in November 1973.

1.4 SURVEY OF PARK-AND-RIDERS

To obtain information about the influence of selected features of the park-and-ride service on commuters' mode choice decisions, surveys were conducted during the first week of February 1973 at the two major lots, Backlick and Springfield Plaza. (A second park-and-ride survey was conducted in March 1973 after the bus service was modified at the two lots.) The Backlick lot is located near the intersection of Industrial and Backlick Roads and the Springfield lot is in the Springfield Plaza Shopping Center near the intersection of Keene Mill and Backlick Roads. See Figure 2 for the location of these lots relative to Shirley Highway and Capitol Beltway.

The first 47 passengers boarding each bus departing the two park-and-ride lots were given questionnaires and asked to complete and return them before leaving the bus. Of the approximately 430 people boarding at the two lots, 420 were given survey forms, and 328 returned them.

Two different questionnaires were used--one for former bus users and one for former auto users. (Park-and-riders were asked by the personnel distributing the forms how they commuted before using the park-and-ride bus.) Former all-auto users were given a yellow form and the all-bus commuters were handed a green questionnaire.

The survey form consisted of four sections printed on a stiff paper folder for easier writing on board a bus. After completing the introductory segment that established the details of the previous mode, the park-and-rider opened the folder to the main section of the questionnaire. (A copy of each form is presented in Appendix A.) The second section focused on what factors people consider when first deciding to change the way they commute to work. The question asked the park-and-rider to assign an importance rating to each of a list of factors.³

This was accomplished by asking the following questions of former auto commuters (a similar question was asked of former users of the preexistent bus service):

In terms of importance to you, how important was each of these factors when you first decided to change from auto commuting and begin using bus service from this park-and-ride lot?

³The order of the lists of factors was reversed on half of the questionnaires to minimize any respondents tendency to rate the first features higher than the last.

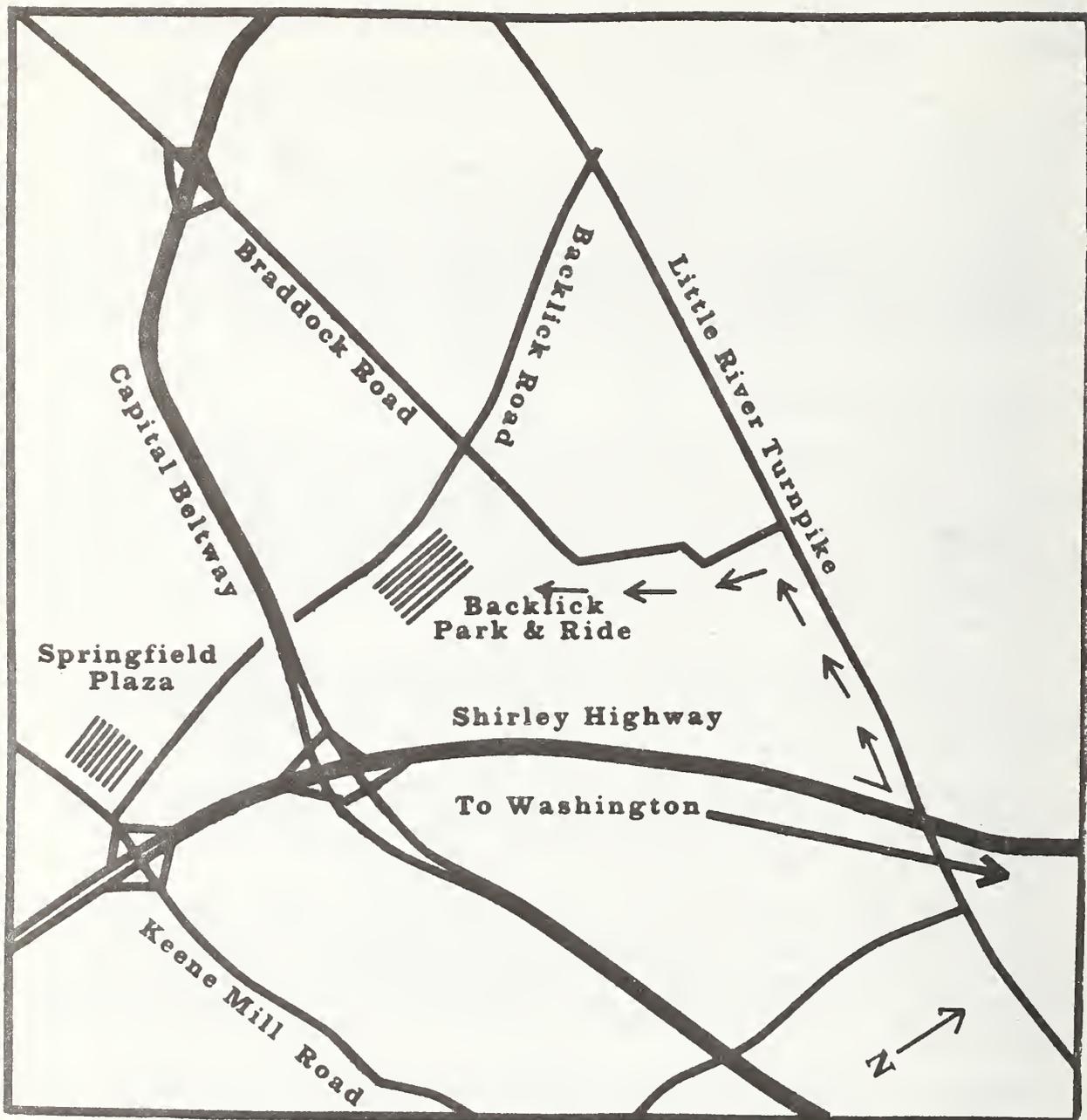


Figure 2. Access to Park-and-Ride Lots from Shirley Highway and Capital Beltway

BESIDE EACH OF THE FACTORS BELOW,
PLACE ONE OF THE FOLLOWING "IMPORTANCE" NUMBERS.

- 1 = of Highest Importance
- 2 = Very Important
- 3 = Important
- 4 = Slightly Important
- 5 = Unimportant or Didn't Consider it

The next section solicited user satisfaction ratings of the same list of bus service related features by asking the following question:

How satisfied are you with each of the following features of bus service from this park-and-ride lot?

BESIDE EACH OF THE FEATURES LISTED BELOW,
PLACE ONE OF THE "SATISFACTION" NUMBERS.

- 1 = Very Satisfied
- 2 = Satisfied
- 3 = Neutral
- 4 = Unsatisfied
- 5 = Very Unsatisfied

The fourth section of the survey form requested detailed trip time and cost information, demographic data, and asked how the user first heard of the bus service at the lot.

2. MAJOR FINDINGS

2.1 SUMMARY OF MAJOR FINDINGS

1. The coordinated development of park-and-ride facilities with express bus lanes and high quality transit service has extended the transit market area and substantially increased transit ridership within the Shirley Highway Corridor. The number of daily park-and-riders has increased from an estimated 4,100 in October 1971 to 5,300 in October 1973. These bus commuter surveys have shown that park-and-riders represent about 25 percent of the Corridor bus ridership.

2. Although the majority of Corridor commuters are from higher income, multiple auto households which are usually associated with all auto commuting, bus service from the park-and-ride lots is attracting these types of suburban commuters. Over 60 percent of the former all-auto commuters drove alone before using the official lots. About 30 percent carpooled before taking the bus.

3. The surveys at the two lots suggest the following consideration for the planning and development of suburban park-and-ride facilities:

- a) The lot should be served by a high quality bus service which encourages the use of transit. These include bus service features such as schedule reliability, convenience of arrival and departure times, and seat availability.
- b) The lot location together with high quality bus service must be perceived by the new user as reducing the level of stress and frustration of commuting, and it must provide convenient parking. (There were no parking charges at the Corridor lots.)
- c) For the relatively affluent commuters in this area, the perceived travel time difference between auto and bus is more important than the daily cost difference.
- d) At these two lots, the least important items were convenience items such as bus shelters, walking distance, car security, and the availability of later evening bus service.

4. The perceived satisfaction ratings for various features of the park-and-ride service indicate that the former all-auto commuters are very satisfied with the bus service features that are important to them. This favorable condition could explain the success of the lots in attracting and retaining bus patrons.

5. Satisfaction responses of park-and-riders differed according to their former mode. Former auto commuters were less sensitive to parking arrangements at the lot and more sensitive to the availability of a seat than were users of the previously existing bus service.

6. Commuters' reactions to the park-and-ride service did not appear to depend upon age, sex, or income.

2.2 THOUGHTS ON FUTURE RESEARCH

This study has focused on the perceived reactions of new users to park-and-ride bus service. An additional approach should survey non-users to obtain their preferences about park-and-ride as a commuting mode. An analysis of both assessments should provide considerable insight into mode choice decisions.

Many factors are important to people when they change modes, and the type of survey data obtained in such a study might be used to develop a practical quantitative model.⁴ A park-and-ride mode choice model based upon user preferences for various transit service features in addition to time and cost savings would provide a valuable planning tool for locating and developing future lots.

⁴See "Park-and-Ride Policy as a Mode Shift Planning Tool," by G. R. Brown, a paper prepared for presentation at the Annual Meeting of the Transportation Research Board, January 1975.

3. PARK-AND-RIDE WITHIN THE SHIRLEY HIGHWAY CORRIDOR

3.1 CORRIDOR-WIDE PARK AND-RIDING

A coordinated development of park-and-ride facilities with the express bus lanes and expanded transit service has substantially increased transit ridership within the Shirley Highway Corridor.⁵ The number of daily park-and-riders has grown from an estimated 4,100 in October 1971 to 5,300 in October 1973. While AM peak period bus patronage within the Corridor increased from about 16,400 in October 1971 to about 21,000 in October 1973, the park-and-ride percentage (taken from bus commuter surveys in October 1971 and November 1973) remained constant, at approximately 25 percent.

Corridor park-and-ride services have been very successful in attracting auto commuters. Of the 900 park-and-riders responding to the November 1973 survey of Corridor bus commuters, about 65 percent indicated that they had commuted by auto prior to using park-and-ride. (About 50 percent had driven alone.) This means that in 1973, an estimated 3,445 of the 5,300 park-and-riders had formerly commuted to work by auto.

Many transit planners contend that very few suburban commuters will use bus service if they are from multiple auto or high income families. This is not true for the park-and-ride bus commuters in the Shirley Corridor as can be seen from an examination of selected demographic characteristics in Table 1. Commuters who park-and-ride have family incomes that are comparable to those of auto commuters and substantially higher than those of walk-on bus commuters. Similarly, Corridor park-and-riders are from families owning about the same number of cars as auto commuters and considerably more than bus commuters. Also park-and-riders and walk-on bus commuters exhibited lower age distributions than the auto commuters which indicates that younger persons are more likely to use the bus service. This is true even in the case of the park-and-riders who have similar income distributions to auto users.

There are many locations where Corridor commuters par-and-ride. However, only three lots have been developed as part of the project by the Northern Virginia Transportation Commission (NVTC) as park-and-ride locations. Two are in large shopping centers (Springfield Plaza and Shirley Plaza) and the other called Backlick, is a permanent parking facility built specifically to serve park-and-riders. (Backlick is the location of a future Metro stop.) Casual parking locations include parking lots of small shopping centers, residential streets, and other ad hoc arrangements.⁶

There is a shortage of official park-and-ride facilities. While the number of daily commuter park-and-riders increased by approximately 1,200 between 1971 and 1973, the number of parking spaces in designated park-and-ride lots increased by only 400. (These spaces are in the permanent park-and-ride lot which opened in October 1972.) This continuing increase in park-and-riders has resulted in a study of additional sites for park-and-ride lots by the Virginia Department of Highways and Transportation.

3.2 DESCRIPTION OF SERVICE AT THE SURVEYED LOTS

Although both the Backlick and Springfield lots are official park-and-ride lots, they are quite different with respect to the quality of service which they provide to bus users. The Backlick lot opened in October 1972, is located away from shopping development and has a bus stop inside the lot. It has a 400 auto capacity, a kiss-and-ride drop-off area, a bicycle rack and a public telephone. However, the location of this lot is somewhat inaccessible for Shirley Highway and Beltway motorists (see arrows in Figure 2, page 4) and the average walk from where cars are parked to the bus boarding point is about 60 yards.

⁵See "Second Year Results Report," Section 3.

⁶A comparison of the demographic characteristics of park-and-riders at an official lot with park-and-riders who casually parked on residential streets did not find any substantial difference between the groups.

Table 1

Distributions of Selected Demographic Characteristics of Corridor Commuters

CHARACTERISTIC	MODE		
	PARK-AND-RIDE (BUS) ^a	AUTO ^b	WALK-ON (BUS) ^a
	PERCENT	PERCENT	PERCENT
<u>Annual Household Income</u>			
Under \$ 5,000	-	-	1
\$5,001 - \$15,000	19	28	34
\$15,001 - \$30,000	66	56	53
Over \$30,000	15	14	12
Total	<u>100</u>	<u>100</u>	<u>100</u>
<u>Autos per Household</u>			
0	1	2	10
1	35	37	63
2	52	50	23
3 or more	12	11	4
Total	<u>100</u>	<u>100</u>	<u>100</u>
Mean auto/household	1.78	1.72	1.31
<u>Age (years)</u>			
Under 21	4	1	3
21-39	60	44	60
40-65	36	54	36
Over 65	0	1	1
Total	<u>100</u>	<u>100</u>	<u>100</u>
<u>Sex</u>			
Males	62	73	56
Females	38	27	54
Total	<u>100</u>	<u>100</u>	<u>100</u>
Number of Observations	910	3,130	2,400

Source:

^aNovember 1973 survey of bus commuters in the Shirley Highway Corridor.^bOctober 1971 survey of auto commuters in the Shirley Highway Corridor.

The Springfield park-and-ride lot opened in June 1971 and comprises a designated portion of the Springfield Plaza Shopping Center parking lot. The lot is accessible from the Shirley Highway (I-95) and the Capital Beltway (I-495) via the Springfield exit, and the bus boarding point is near the designated park-and-ride spaces.

Both of these park-and-ride lots are served by the same bus route, Washington Metropolitan Transit Authority Metrobus route 18X. At the time the survey was conducted (February 1973), route 18X began at the Backlick lot and picked up passengers at the Springfield Plaza lot before getting onto the Shirley Highway at the Springfield entrance. Thus, Backlick riders were assured of a seat while some riders at Springfield had to stand. (This route was modified in March 1973, reversing the sequence of service at the two lots). Service was provided by new buses with special interior features (wider seats, carpeted walls and floors, etc.).⁷ Bus headways in February 1973 averaged 15 minutes (service was offered only during peak periods); and travel times between Farragut Square in downtown Washington, D.C. and the Springfield Plaza and Backlick park-and-ride lots averaged 32 and 39 minutes respectively. (Trip lengths are 14.7 miles and 15.9 miles.)

3.3 CHARACTERISTICS OF PARK-AND-RIDERS AT OFFICIAL LOTS

The survey provides considerable information about the demographic characteristics and trip-making behavior of the park-and-riders. Highlights of the information are presented here, and the complete tabulations are in Tables 6, 7, 8, and 9 in Appendix B.

The demographic characteristics of the former all-auto commuters and bus riders are quite similar at both official lots and are not substantially different from the total Corridor distributions presented in Table 1. In addition, it seems that the official lots are not attracting a different type of commuter than the unofficial and casual parking areas throughout the Corridor.

Access to the two lots are primarily by auto - about 70 percent drive alone while about 10 percent drive with passengers and only four percent kiss-and-ride. Over 10 percent park near the lots which may indicate some people can obtain shorter walking distances there than in the lots.

About 80 percent of the park-and-riders indicated that they use the lots five days per week. The major destination at Springfield is downtown Washington, (88 percent) while the Pentagon and downtown Washington share the market at Backlick with 45 and 41 percent, respectively.

About 60 percent of the former all-auto commuters drove alone before using the lots, while over 30 percent carpooled before taking the bus. A third of the former bus commuters walked to a bus boarding point and almost a third parked near a bus stop before using the lots.

The Backlick lot was opened in October 1972 with a concerted advertising campaign including newspaper ads and mass mailings to the service area. Almost one third of the users at the lot indicated that the mail advertisements were how they first heard of the service. This was about the same as indicated "word of mouth." Seventeen percent saw the newspaper ads while 10 percent saw the roadway signs indicating the location of the lot. Over half began using the lot when it opened, with 22 percent starting in the first month and about 10 percent each following month.

⁷See "The Shirley Highway Express Bus-on-Freeway Demonstration Project--Users' Reaction to Innovative Bus Features," Interim Report 3, June 1973.

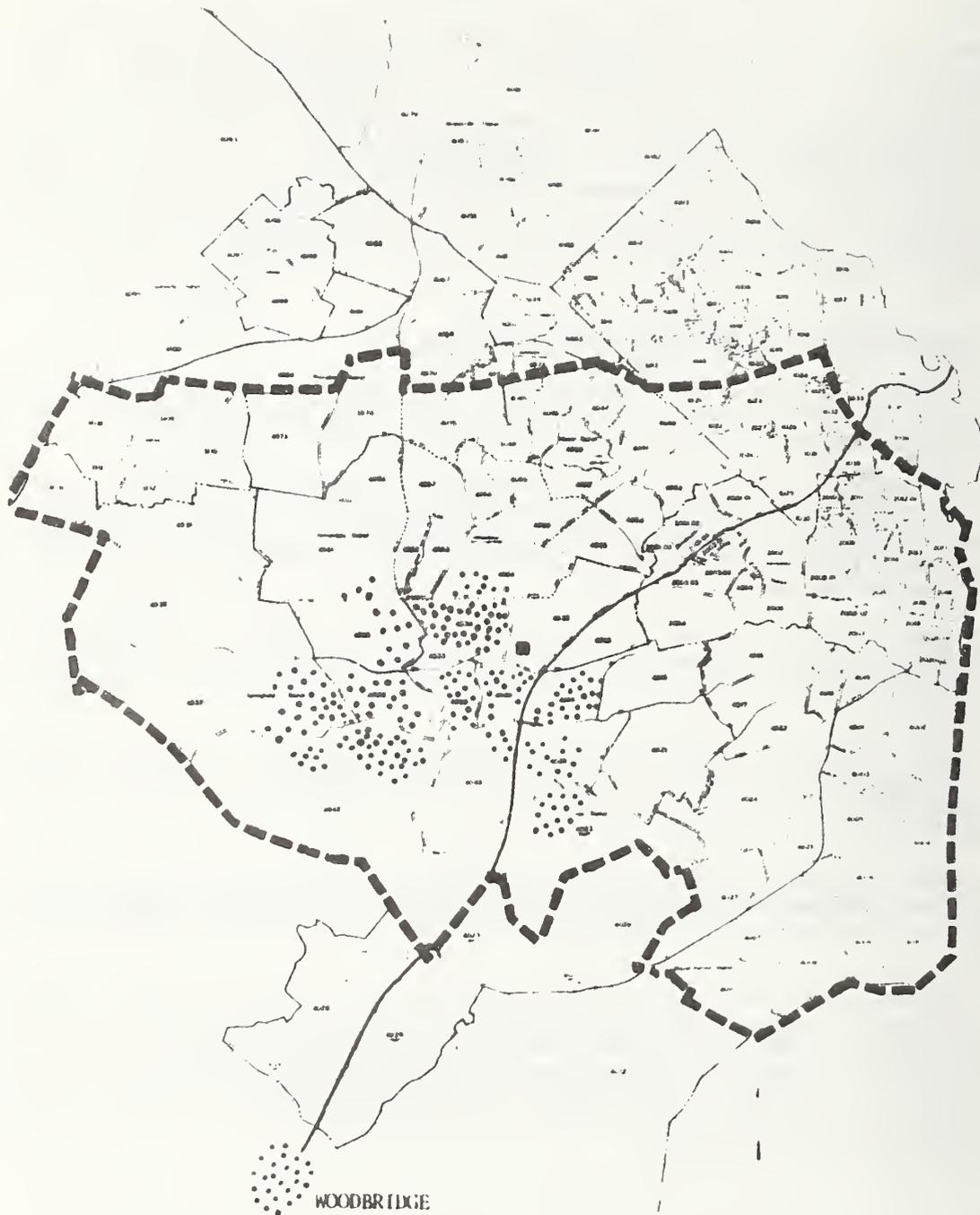


Figure 5. Origins (Inbound Trip) to Backlick Park-and-Ride lot

3.4 LOT SERVICE AREA AND ACCESS TIMES

The origins of the park-and-riders at Backlick are indicated in Figure 3. Each dot on the map shows a commuter's origin. The spatial distribution of the trip origins shows how far the bus market can be extended in a suburban area through the use of park-and-ride lots. For the majority of the users of the bus service from this park-and-ride lot, the distance between home and the lot was greater than two miles. For 20 percent of the park-and-riders this distance was as much as five miles.

Even with this large market area, the access travel time from home to the lot averaged only 13.1 minutes and almost 60 percent traveled less than 10 minutes. The access time was about 25 percent of the total door-to-door time (see Section 5.1). In suburban areas, auto access can thus extend bus service over large areas with small time penalties for the commuter.

4. WHAT INFLUENCED AUTO COMMUTERS TO CHANGE TO BUS SERVICE AT PARK-AND-RIDE LOTS

4.1 THE IMPORTANCE OF FEATURES

Many factors are important to people when they change their mode of commuting to work. The development of a high quality park-and-ride service at the two lots provided an opportunity to examine new park-and-ride commuters' assessments of factors that were important when they first decided to change from all-auto commuting to using bus service at the lots. This study of mode choice behavior relied on the users' perceived values of numerous characteristics of the available modes. No attempt was made to develop a quantitative model of park-and-ride mode choice, but the results do provide considerable insight into what variables should be considered when developing suburban park-and-ride facilities.

Table 2 presents the ranking of the features based upon the percentage of respondents indicating either "of highest importance" or "very important." Details of all ratings are indicated graphically in Appendix C.

Former auto commuters at Backlick and Springfield Plaza are in general agreement on the relative importance of the twelve features cited. About 80 percent rated the same three features very highly (either "of highest importance" or "very important"): 1) stress and frustration of commuting, 2) schedule reliability and 3) convenience of arrival and departure times. Over 50 percent rated parking convenience and the difference in door-to-door travel time very high. Seat availability was ranked fifth by the Backlick lot users and seventh at Springfield.

Former auto users at the two lots differ in their assessment of "difference in total daily commuting cost." Springfield riders rank it sixth and Backlick riders ninth. This may reflect the destinations of the users, with about 95 percent of the Springfield riders and only 40 percent of the Backlick riders working in downtown Washington where parking charges are high. (See paragraph 5.2 for a further investigation of parking costs.)

Only 40 percent of the former all-auto commuters rated availability of evening bus service and security of the parking lot very highly. Riders at both lots rated the same three features very lowly: 1) making auto available to other members of household, 2) difference in the amount of walking required and 3) shelter at boarding point.

Variations among the importance responses of different sex, age and income groupings of former auto users at Backlick were investigated (see Tables 7 and 8 in Appendix B). The analysis indicated that the rankings of the responses of each group were similar to those of its counterpart (e.g., rankings of responses of male commuters followed a trend similar to that of female commuters).

It is interesting to note that the former all-bus users are in a general agreement with the former all-auto commuters on the relative importance of the twelve features. At least in this suburban area with relatively high quality bus service, the importance of factors influencing commuters to use park-and-ride doesn't vary between former auto and bus users.

Table 2
 Summary of Importance Responses from February 1973 Park-and-Ride Survey.^a

FEATURES	PARK-AND-RIDERS RESPONDING "OF HIGHEST IMPORTANCE" OR "VERY IMPORTANT"					
	BACKLICK LOT			SPRINGFIELD LOT		
	FORMER AUTO USERS (136)	FORMER BUS USERS (125)	FORMER AUTO USERS (56)	FORMER AUTO USERS (136)	FORMER BUS USERS (125)	FORMER AUTO USERS (56)
	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK
Difference in the level of stress and frustration of commuting	83	1	71	3	86	1
Schedule reliability	80	2	76	2	85	2
Convenience of bus arrival and departure times	78	3	77	1	85	2
Parking convenience	58	4	36	7	62	5
Seat Availability	54	5	64	4	42	7
Difference in door-to-door travel time ^b	54	5	51	5	69	4
Availability of late evening bus service	44	7	40	6	40	9
Security of this parking lot	39	8	21	9	42	7
Difference in total daily commuting cost	33	9	28	8	46	6
Shelter at bus boarding point	25	10	22	10	13	11
Difference in required walking	22	11	19	11	20	10
Making auto available to others	12	12	--	--	3	12

(.) Number of Responses

^aFor each group of park-and-riders, the feature with the highest percentage of either "of highest importance" and "very important" responses is ranked number one.

^bTies are assigned the same rank.

Table 3

Summary of Satisfaction Responses from February 1973 Park-and-Ride Survey^a

FEATURES	PARK-AND-RIDERS RESPONDING "VERY SATISFIED" OR "SATISFIED"										
	BACKLICK LOT				SPRINGFIELD LOT						
	FORMER AUTO USERS (136)		FORMER BUS USERS (125)		FORMER AUTO USERS (56)						
	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK	
Bus schedule reliability	91	1	90	2	74	7					
Level of stress and frustration of commuting	90	2	84	4	80	6					
Convenience of bus arrival and departure times	85	3	88	3	86	4					
Seat availability	85	4	91	1	12	10					
Parking convenience	84	5	72	7	91	1					
Availability of evening bus service	82	6	82	5	88	2					
Door-to-door travel time	74	7	81	6	85	5					
Amount of walking required ^b	61	8	50	10	88	2					
Total daily commuting cost	60	9	57	8	44	9					
Security of this parking lot	59	10	56	8	67	8					
Shelter at bus boarding point	35	11	25	11	3	11					

(.) Number of Responses

^aRank - For each group of park-and-riders, the feature with highest percentage of "very satisfied" or "satisfied"

^bTies are assigned the same rank.

In terms of developing suburban park-and-ride facilities to attract former auto users, the following planning considerations are suggested by this survey: Bus service at the lot should be high quality and therefore, encourage the use of transit. Bus service features such as schedule reliability, convenience of arrival and departure times, and seat availability are all very important to a potential park-and-ride. The lot location together with the high quality bus service must be perceived by the new users as reducing the level of stress and frustration and, providing convenient parking. For affluent commuters, the perceived travel time difference is more important than the daily cost difference. (See Section 5.2 for more detailed examination of the time and cost savings.) Much less important for new park-and-riders are lot convenience items such as bus shelters and walking distance, car security, and the availability of later evening bus service.

4.2 SATISFACTION RESPONSES TO FEATURES

The satisfaction responses constitute a subjective assessment of the quality of the service (as reflected by the 11 features appearing in the survey form) provided at the park-and-ride lots. These responses are, therefore, affected by the service provided at the lots (e.g., actual bus adherence to schedule times) and by the perceptions of the persons surveyed.

A summary of the satisfaction responses of the former auto users and users of the pre-existent bus service is presented in Table 3. (Details of the responses of former auto users are presented in Appendix C.) Except for seat availability and parking convenience, park-and-riders at the Backlick lot are in general agreement about their satisfaction with the park-and-ride service. The former bus users were less critical of seat availability, perhaps because they are more accustomed to crowded buses than former auto users (who had previously enjoyed the spaciousness of their autos). Similarly, former auto commuters, accustomed to the parking situation in downtown Washington, can appreciate the availability of parking at the lot more so than the former bus users.

Rankings of satisfaction responses of former auto users at Springfield Plaza differ from those of their counterparts at Backlick. In contrast to the relatively high degree of satisfaction with schedule reliability and seat availability reported by the former auto users at Backlick, former auto users at Springfield reported less satisfaction with the reliability of the bus service provided them and substantially less satisfaction with the availability of seats. Another difference involved the lower satisfaction with the walking distance to the boarding point displayed by former auto users at Backlick. The differences in the satisfaction responses of former auto users are consistent with the differences in the service provided at the two park-and-ride lots (refer to paragraph 3.2). An analysis of the rankings of the satisfaction responses (see Tables 9 and 10 in Appendix B) found only a slight variation with age, sex or income.

4.3 SATISFACTION VERSUS IMPORTANCE RESPONSES

Commuter satisfaction and importance ratings were related in order to further investigate actions that might prove effective in attracting auto commuters to bus service at the park-and-ride lots. The satisfaction and importance responses can be interpreted in the following way:

- (1) If bus commuters indicated that a feature was relatively unimportant, then any related improvement should be assigned a low priority even if the commuters have expressed dissatisfaction.
- (2) If bus commuters express dissatisfaction with a feature and place relatively high importance on it, then a situation exists which may not be conducive to retaining the present patrons or attracting new riders; related improvements should be assigned high priorities.

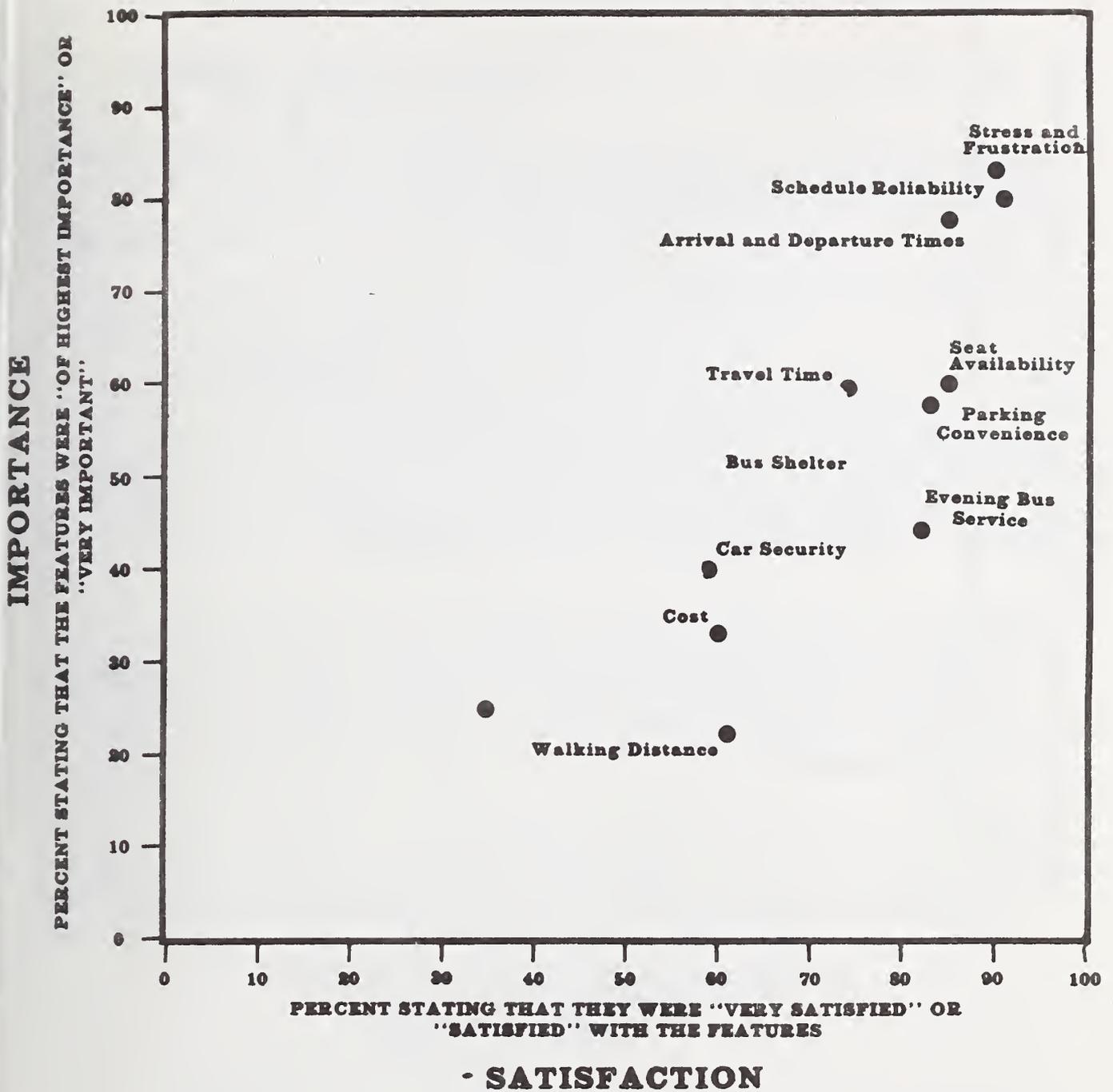


FIGURE 4. Importance Versus Satisfaction Responses of Former Auto Users at Backlick

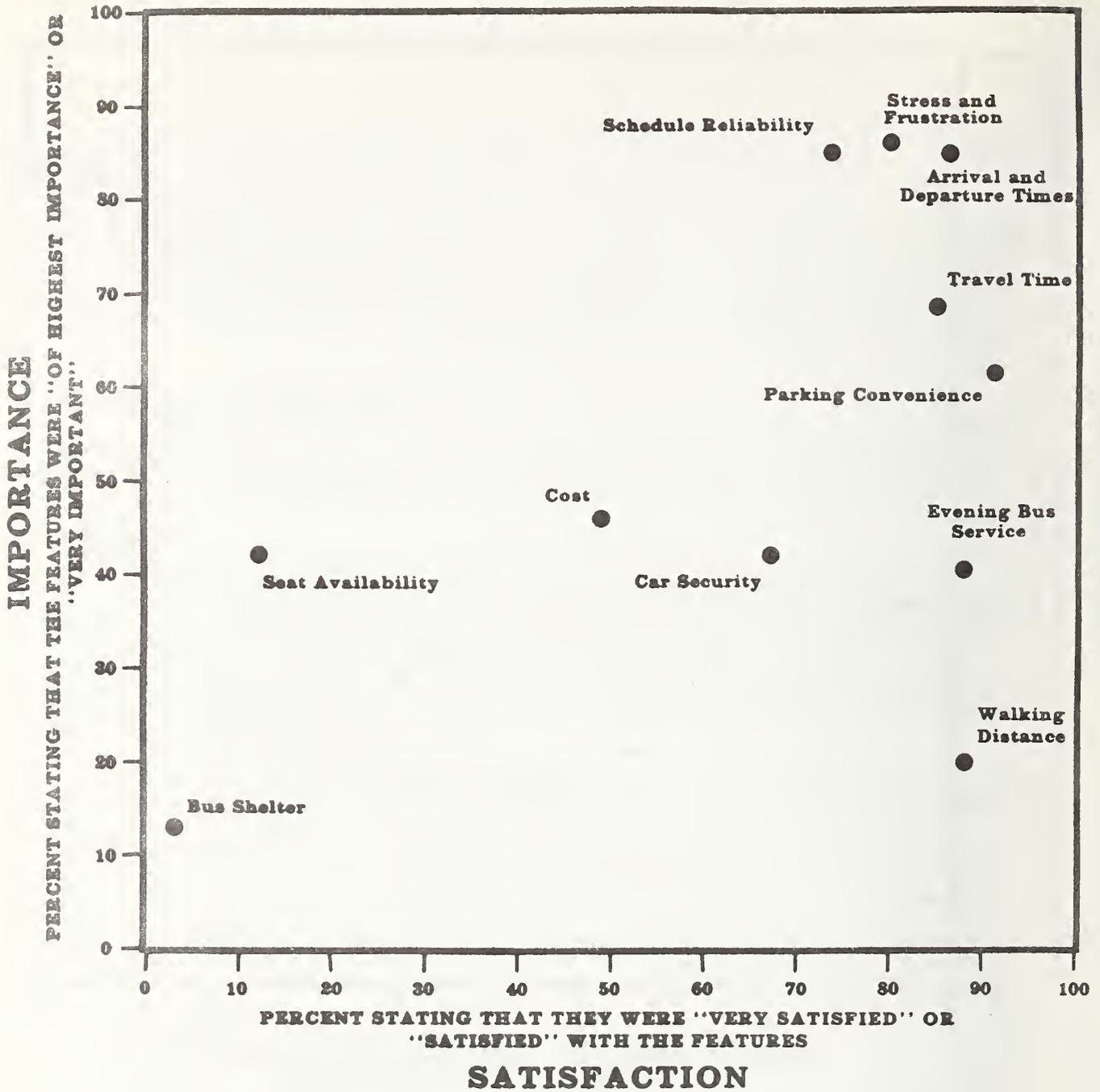


FIGURE 5. Importance Versus Satisfaction Responses of Former Auto Users at Springfield Plaza

- (3) If the importance and satisfaction responses for a feature are high, this suggests the existence of favorable conditions for retaining and attracting bus patrons.

The relationship of satisfaction and importance responses of former auto users at the Backlick and Springfield Plaza parking lots are presented in Figures 4 and 5. Points in the lower left correspond to features which were rated as unimportant and with which commuters were dissatisfied. Points in the upper right hand corner correspond to features which were rated as highly important and with which commuters were quite satisfied.

In general, the former auto users are very satisfied with bus service features that are important to them. This probably indicates why the high quality bus service park-and-ride lots are successful throughout the Corridor.

The largest patronage increases are likely to result from strategies directed at (2) above. For example, at the time of the February 1973 survey, former auto users at Springfield were dissatisfied with seat availability, which they rated high in importance. At that time, cars parking in the Springfield and Backlick lots during the peak period numbered about 125 and 250 respectively. In March 1973, the order of the bus service at the two lots was changed (buses started at Springfield and then proceeded to Backlick). As a result, seat availability and schedule adherence were improved for riders boarding at the Springfield lot and travel time was reduced for riders boarding at the Backlick lot (from 39 to 35 minutes). Travel time was increased for riders boarding at Springfield (from 32 to 44 minutes).

A second survey identical to the first one was conducted at the two lots during the week of March 26, 1973. Satisfaction responses at Springfield (persons surveyed during the first park-and-ride survey were not included) indicated a marked change in the bus riders' approval of the situation with respect to the availability of seats and bus schedule reliability. Satisfaction with bus schedule reliability did not change at the Backlick lot, and satisfaction with the availability of seats declined slightly. (See Appendix E for the results.) By June 1974, the number of cars parking in the Springfield lot during the peak period had grown to more than 325. Peak period parking at the Backlick lot has remained constant, at approximately 250 cars.

Some of the increase in the utilization of the Springfield lot can be attributed to improvements in schedule adherence and seat availability. However, it is also likely that some of the increase at Springfield has occurred because the lot is visible from the Shirley Highway and more accessible to the southern part of the Corridor. (See Figure 2.)

5. HOW TRAVEL TIME AND PARKING COST SAVINGS INFLUENCE AUTO COMMUTERS TO CHANGE TO PARK-AND-RIDE

5.1 TRAVEL TIME SAVINGS FOR FORMER AUTO USERS

Most inquiries into travel behavior have found that commuters consider travel time and cost as important factors in their modal choice decisions.⁸ A recent study found that a reduction in travel cost was the main reason why auto commuters shifted to park-and-ride.⁹ In this section, a comparison of the times and parking costs by auto with the present park-and-ride experiences will provide some insight into the significance of these factors.

⁸See D. Brand "Travel Demand Forecasting: Some Foundations and a Review in Urban Travel Demand Forecasting," Special Report 143, Transportation Research Board, 1973.

⁹G. R. Brown, "Park and Ride Policy as a Mode Shift Planning Tool," prepared for the annual meeting of the Transportation Research Board, January 1975.

The perceived travel time distributions for the various components of the present park and-ride commute trip and the former auto trip for the Backlick lot are presented in Table 4. (The distributions were almost identical at Springfield.) Most of the park-and-riders take less than 20 minutes to drive to the lot, wait less than 10 minutes for a bus and spend less than 30 minutes on the bus. The average total time is 49.7 minutes. Previously, they drove and parked in an average of 46.9 minutes. The walking time to the office was about six minutes from bus stop or parked car. Thus on an average the door-to-door time savings is only three minutes for a 50 minute trip.

A more detailed picture of the travel time savings can be obtained for both Backlick and Springfield users in Table 5. Sixty-eight percent at both lots have a perceived time savings for the same trip time while the remainder have present travel times that were greater than times by their previous auto trip.

Reported travel times of the "Travel Time Conscious Group" (survey respondents who rated travel time is either "of highest importance" or "very important") are also presented in Table 5. Even for this group, about 30 percent are losing time.

Other factors such as stress and frustration and bus service quality were perceived as very important by most of park-and-riders. Nonetheless, travel time savings are significant for a majority and should not be neglected when developing park-and-ride facilities.

Table 4
Reported Travel Times of former Auto Commuters
at Backlick lot

MODE	TRAVEL TIME (MINUTES)							AVERAGE TRAVEL TIMES (Minutes)
	0-10	11-20	21-30	31-45	46-60	61-75	75	
Percent of Respondents								
Present Park-and-Ride Trip								
Home to Bus Stop	58	29	10	1	2	-	-	13.1
Waiting for Bus	98	2	-	-	-	-	-	4.9
Line Haul	2	36	42	17	2	-	-	26.2
Walk to Work	94	3	2	-	-	-	-	5.5
Door-to-Door	-	-	9	40	32	15	4	49.7
Former Auto Trip								
Home to work (Park)	1	2	16	38	34	4	1	46.9
Walk to Work	90	9	1	-	-	-	-	6.0
Door-to-Door	1	-	8	28	39	16	5	52.9

92 Respondents

Source: February 1975 Park-and-Ride Survey

Table 5

Distribution of Door-to-Door Travel Time Savings
(Previous Auto Minus Present Park-and-Ride)

LOT	MINUTES SAVED					MINUTES LOST				AVERAGE TIME SAVINGS (Minutes)
	30	30-21	20-11	10-1	0	1-10	11-20	21		
	Percent of Respondents									
<u>Backlick</u>										
All (92)	5	8	10	34	11	17	10	5		3.2
Travel Time Conscious (49)	8	12	14	33	4	16	6	6		7.9
<u>Springfield</u>										
All (33)	9	15	15	18	-	12	6	24		1.3
Travel Time Conscious (23)	9	22	9	22	-	9	9	22		2.5

(.) Number of Respondents

Source: February 1973 Park-and-Ride Survey

5.2 PARKING COST SAVINGS FOR FORMER AUTO COMMUTERS

Since parking is free at the park-and-ride lots, auto commuters save parking charges when they use them. Table 6 presents the distributions of the parking costs of the former auto commuters. Almost two-thirds of the Backlick riders previously parked free and the average cost for those who did pay was \$28.70 per month. At Springfield, only 29 percent had parked free, and the rest paid an average of \$29.38 per month. For comparison, the monthly bus fare is about \$29.00

As discussed in Section 3, the difference in daily cost to commute was rated more important for the Springfield riders than the Backlick users. In addition, the reported parking costs of the "Cost Conscious Group" (survey respondents who rated difference in total daily commuting costs as "of highest importance" or "very important") are also shown in Table 6. At both lots, these groups saved more in parking charges than other, less cost sensitive park-and-riders.

Table 6

Reported Monthly Parking Costs of Former Auto Commuters

LOT	COST PER MONTH						AVERAGE COST
	Free	0-\$10	\$11-20	\$21-30	\$31-40	MORE THAN \$41	
<u>Backlick Lot</u>							
All	64	12	2	6	8	8	\$28.70
Cost Conscious Group (49)	17	23	-	15	23	28	35.97
<u>Springfield Lot</u>							
All (33)	29	14	11	11	20	15	\$29.38
Cost Conscious Group (16)	-	8	15	23	38	16	31.35

(.) Number of respondents

Source February 1973 Park-and-Ride Survey

APPENDIX A

Park-and-Ride Survey Questionnaire Forms

Former Bus Commuter
Former Auto Commuter

FORMER BUS COMMUTER

Dear Commuter:

Form Approved
OMB No. 41572113

NBS-729
(1-73)

"Park and Ride" lots are just beginning to be used as a way of making it easier for more people to use buses. The opinions of new users of a park/ride lot, such as yourself, will be useful in improving this idea. In this questionnaire we are asking about two main factors: (1) Why did you decide to use this park/ride lot in the first place, and (2) What are your reactions and suggestions about this particular park/ride lot. Please take a few minutes to help us improve your bus service by filling in this questionnaire.

(Please answer all questions. If you are not certain, please make your best estimate.)

1. How do you usually get to this park/ride lot in the morning? (CHECK ONE ANSWER BELOW)

- Drive by myself and park in the lot.
- Drive myself and passenger(s) and park in the lot.
- Passenger in a car which parks in the lot.
- Passenger in a car and am dropped off at lot.
- Drive or ride in a car that parks near but not in the lot.
- Other (please specify) _____

2. How many days a week do you usually use this lot? _____ Day(s)

3. Before using bus service from this park/ride lot, how did you get to the bus stop you were then using? (Check usual means)

- Drove my car and parked at another park/ride lot.
- Was driven to bus stop by another person.
- Drove my car and parked on street near bus stop.
- Walked from home to bus stop.
- Other (please specify) _____

4. A. Which bus route did you use previously?

_____ (Route) _____ (Bus Company)

B. Did you usually get a seat? Yes No

5. A. Are you now living in the same location as you were when you commuted to work by the means checked in Question 3 above?

Yes No

B. Are you now working in the same location as you were when you commuted to work by the means checked in Question 3 above?

Yes No

Survey Conducted by
National Bureau of Standards
Sponsored by Department of Transportation

PLEASE OPEN 

6. Below is a list of some of the factors people consider when deciding to change the way they get to work. In terms of importance to you how important was each of these factors when you first decided to use this park/ride lot?

BESIDE EACH OF THE FACTORS BELOW,
PLACE ONE OF THE FOLLOWING "IMPORTANCE" NUMBERS.

- 1 = Of Highest Importance
2 = Very Important
3 = Important
4 = Slightly Important
5 = Unimportant or Didn't Consider It

DECISION
"IMPORTANCE"
NUMBER

- _____ Availability of evening bus service (after 6 P.M.) to this lot.
_____ Security of car parked at this lot.
_____ Shelter at bus boarding point.
_____ The difference in total daily cost to commute from this lot.
_____ The difference in total door-to-door travel time (from your front door to your office).
_____ Convenience of parking at this lot.
_____ The difference in the level of stress and frustration of commuting.
_____ Availability of a seat on the bus.
_____ The difference in the total amount of walking required.
_____ Schedule reliability of bus service from this park/ride lot.
_____ Convenience of bus arrival and departure times from this lot.

What other factors influenced your decision to use bus service from this park/ride lot?

CONTINUE

7. How satisfied are you with each of the following features of bus service from this park/ride lot?

BESIDE EACH OF THE FEATURES LISTED BELOW,
PLACE ONE OF THE "SATISFACTION" NUMBERS.

- 1 = Very Satisfied
- 2 = Satisfied
- 3 = Neutral
- 4 = Unsatisfied
- 5 = Very Unsatisfied

"SATISFACTION"
NUMBER

- _____ Shelter at bus boarding point.
- _____ Distance required to walk from parking area to bus boarding point.
- _____ Hours of bus service at this lot.
- _____ Level of stress and frustration of commuting.
- _____ Total daily cost to commute.
- _____ Availability of a seat on the bus.
- _____ Convenience of bus arrival and departure times at this lot.
- _____ Schedule reliability of bus service.
- _____ Total door-to-door travel time (home to office).
- _____ Security of car at this lot.
- _____ Convenience of parking.

What other features are you especially satisfied with at this park/ride lot?

What other features are you especially dissatisfied with? _____

8. Concerning your bus commute prior to using this park/ride lot:

How much time did you usually spend:

- A. Getting from your home to the bus stop? _____ Minutes
 - B. Waiting for the bus to arrive? _____ Minutes
 - C. From the time you got on the bus until you arrived at your final bus stop? _____ Minutes
 - D. From your final bus stop to your place of work? _____ Minutes
- What was your total one-way bus fare? _____¢

PLEASE TURN PAGE

9. When going to work from this park/ride lot, how much time do you usually spend:

- A. Getting from your home to the bus boarding point? _____ Minutes
- B. Waiting for the bus to arrive? _____ Minutes
- C. From the time you get on the bus until you arrive at your final bus stop? _____ Minutes
- D. From your final bus stop to your place of work? _____ Minutes

10. Where did you begin your trip today? (Home address)

_____ (Nearest Intersection or Street Address)
_____ (City and ZIP Code)

11. Where is your final destination?

- Pentagon Southwest (D.C.) Downtown (D.C.) Other (specify) _____

12. For our STATISTICAL SUMMARIES, please indicate your:

A. AGE: Under 21 21 to 39 40 to 65 Over 65

B. SEX: Male Female

C. NUMBER OF PEOPLE IN HOUSEHOLD _____ NUMBER OF AUTOS IN HOUSEHOLD _____

D. TOTAL ANNUAL HOUSEHOLD INCOME:

- \$0 to \$5,000 \$15,001 to \$30,000
 \$5,001 to \$15,000 Over \$30,000

13. When did you first begin using this park/ride lot? _____ month _____ year

14. How did you first hear of bus service from this park/ride lot? (CHECK ONE)

- Newspaper Advertisements Mail Advertisements Roadway Signs
 Word of Mouth Radio Other(specify) _____

Any Comments? _____

THANK YOU, WE HOPE YOU
ENJOY OUR SERVICE

FORMER AUTO COMMUTER

Form Approved
OMB No. 4187-2114

Dear Commuter:

"Park and Ride" lots are just beginning to be used as a way of making it easier for more people to use buses. The opinions of new users of a park/ride lot, such as yourself, will be useful in improving this idea. In this questionnaire we are asking about two main factors: (1) Why did you decide to use this park/ride lot in the first place, and (2) What are your reactions and suggestions about this particular park/ride lot. Please take a few minutes to help us improve your bus service by filling in this questionnaire.

(Please answer all questions. If you are not certain, please make your best estimate.)

1. How do you usually get to this park/ride lot in the morning? (CHECK ONE ANSWER BELOW)

- Drive by myself and park in the lot.
- Drive myself and passenger(s) and park in the lot.
- Passenger in a car which parks in the lot.
- Passenger in a car and am dropped off at lot.
- Drive or ride in a car that parks near but not in the lot.
- Other (please specify) _____

2. How many days a week do you usually use this lot? _____ Day(s)

3. Before using bus service from this park/ride lot, how did you usually commute to work? (CHECK ONE ANSWER BELOW)

- Drove alone.
- Drove with passenger(s) -- Was usually the driver
- Auto passenger - Almost never drove.
- Alternated between being a passenger and the driver - Carpool.
- Other (please specify) _____

4. A. Are you now living in the same location as you were when you commuted to work by the means checked in Question 3 above?

Yes No

- B. Are you now working in the same location as you were when you commuted to work by the means checked in Question 3 above?

Yes No

Survey Conducted by
National Bureau of Standards
Sponsored by Department of Transportation

5. Below is a list of some of the factors people consider when deciding to change the way they get to work. In terms of importance to you how important was each of these factors when you first decided to change from auto commuting and begin using bus service at this park/ride lot?

BESIDE EACH OF THE FACTORS BELOW,
PLACE ONE OF THE FOLLOWING "IMPORTANCE" NUMBERS.

- 1 = Of Highest Importance
2 = Very Important
3 = Important
4 = Slightly Important
5 = Unimportant or Didn't Consider It

DECISION
"IMPORTANCE"
NUMBER

- _____ Convenience of bus arrival and departure times from this lot.
_____ Schedule reliability of bus service from this park/ride lot.
_____ The difference in the total amount of walking required.
_____ Availability of a seat on the bus.
_____ The difference in the level of stress and frustration of commuting.
_____ Convenience of parking at this lot.
_____ The difference in total door-to-door travel time (from your front door to your office).
_____ The difference in total daily cost to commute from this lot.
_____ Shelter at bus boarding point.
_____ Security of car parked at this lot.
_____ Availability of evening bus service (after 6 P.M.) to this lot.
_____ Making auto available to other members of your household.

What other factors influenced your decision to use bus service from this park/ride lot?

CONTINUE

6. How satisfied are you with each of the following features of bus service from this park/ride lot?

BESIDE EACH OF THE FEATURES LISTED BELOW,
PLACE ONE OF THE "SATISFACTION" NUMBERS.

- 1 = Very Satisfied
- 2 = Satisfied
- 3 = Neutral
- 4 = Unsatisfied
- 5 = Very Unsatisfied

"SATISFACTION"
NUMBER

- _____ Convenience of parking.
- _____ Security of car at this lot.
- _____ Total door-to-door travel time (home to office)
- _____ Schedule reliability of bus service.
- _____ Convenience of bus arrival and departure times at this lot.
- _____ Availability of a seat on the bus.
- _____ Total daily cost to commute
- _____ Level of stress and frustration of commuting
- _____ Hours of bus service at this lot
- _____ Distance required to walk from parking area to bus boarding point.
- _____ Shelter at bus boarding point.

What other features are you especially satisfied with at this park/ride lot?

What other features are you especially dissatisfied with? _____

7. Before using bus service from this park/ride lot, how much time did you usually spend:

- A. Traveling from home until you left the car near work? ___ Minutes
- B. Walking from the car to your place of work? ___ Minutes
- Did not commute

8. Before using bus service from this park/ride lot, how much did you usually pay for parking?

\$ _____ per _____.

Parked Free. Did not commute.

PLEASE TURN PAGE

9. When going to work from this park/ride lot, how much time do you usually spend:

- A. Getting from your home to the bus boarding point? _____ Minutes
- B. Waiting for the bus to arrive? _____ Minutes
- C. From the time you get on the bus until you arrive at your final bus stop? _____ Minutes
- D. From your final bus stop to your place of work? _____ Minutes

10. Where did you begin your trip today? (Home address)

(Nearest Intersection
or Street Address)

(City and ZIP Code)

11. Where is your final destination?

- Pentagon Southwest (D.C.) Downtown (D.C.) Other (specify) _____

12. For our STATISTICAL SUMMARIES, please indicate your:

A. AGE: Under 21 21 to 39 40 to 65 Over 65

B. SEX: Male Female

C. NUMBER OF PEOPLE IN HOUSEHOLD _____ NUMBER OF AUTOS IN HOUSEHOLD _____

D. TOTAL ANNUAL HOUSEHOLD INCOME:

- \$0 to \$5,000 \$15,001 to \$30,000
 \$5,001 to \$15,000 Over \$30,000

13. When did you first begin using this park/ride lot? _____ month _____ year

14. How did you first hear of bus service from this park/ride lot? (CHECK ONE)

- Newspaper Advertisements Mail Advertisements Roadway Signs
 Word of Mouth Radio Other (specify) _____

Any Comments? _____

THANK YOU, WE HOPE YOU
ENJOY OUR SERVICE

APPENDIX B

Characteristics of Park-and-Riders at Official Lots (February 1973)

Table 7

Demographic Characteristics of Surveyed Lot Users'

CHARACTERISTICS	LOT			
	BACKLICK		SPRINGFIELD	
	TOTAL USERS PERCENT	FORMER AUTO USERS PERCENT	FORMER BUS USERS PERCENT	FORMER AUTO USERS PERCENT
<u>Annual Household Income</u>				
\$ 0 - 5,000	0	0	0	0
5,000-15,000	16	15	19	21
15,000-30,000	69	69	70	66
Over -30,000	14	16	11	13
Total	99	100	100	100
<u>Autos Per Household</u>				
0	2	1	4	2
1	26	23	29	11
2	62	64	59	73
3 or more	10	12	8	14
Total	100	100	100	100
Mean Autos/Household	1.82	1.91	1.72	1.91
<u>Age (years)</u>				
Under 21	3	2	3	0
21-39	52	51	56	54
40-65	45	47	41	43
Over 65	0	0	0	3
Total	100	100	100	100
<u>Sex</u>				
Male	73	75	70	74
Female	27	25	30	26
Total	100	100	100	100

Number of Observations 270 145 125 58

1 Former Bus Users Not Surveyed.

Table 8

Selected Trip Characteristics at Surveyed Lots¹

CHARACTERISTICS	LOT			
	BACKLICK		SPRINGFIELD	
	TOTAL USERS PERCENT	FORMER AUTO USERS PERCENT	FORMER BUS USERS PERCENT	FORMER AUTO USERS PERCENT
<u>Access Mode</u>				
Drive Alone	64	66	59	86
Drive with Passenger	11	12	10	6
Kiss - Ride	4	3	6	0
Park Near Lot	13	16	11	6
Other	8	3	14	2
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>Days Use Lot</u>				
1	3	3	3	0
2	3	3	4	6
3	3	3	4	15
4	8	5	10	0
5	83	84	79	79
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>Trip Destination</u>				
Downtown Washington	41	40	42	88
Pentagon	45	45	44	3
S.W. Washington	10	11	10	9
Other	4	4	4	0
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Number of Observations 270 145 125 58

1 Former Bus Users Not Surveyed

Table 9

Commute Mode Prior To Using Lot

COMMUTE TO WORK MODE	LOT	
	BACKLICK PERCENT	SPRINGFIELD PERCENT
<u>Former Auto Users</u>		
Drove Alone	55	60
Drove with Passengers	8	9
Passenger	8	3
Carpool	21	23
Other	8	5
Total	100	100
Number of Observations	145	58
<u>Former Bus Users</u>		
Drove and Parked at Other Lot	14	
Kiss - Ride at Bus Stop	14	
Parked Near Bus Stop	31	
Walked	31	
Other	10	
Total	100	
Number of Observations	125	

Table 10

User Reaction to Advertising and When Began Using Backlick Lot

HOW FIRST LEARNED OF SERVICE	FORMER AUTO USERS PERCENT	FORMER BUS USERS PERCENT
Newspaper Ads	17	17
Mail Ads	33	31
Roadway Signs	10	11
Word of Mouth	32	27
Radio	-	2
Flyer	3	3
Other	5	9
Total	100	100
<u>WHEN BEGAN USING</u>		
When Opened	53	54
1 Month after opening	22	15
2 Months after opening	12	15
3 Months after opening	13	16
Number of Observations	203	125

APPENDIX C

Detailed Responses of Former Auto Users
to February 1973 Park-and-Ride Survey

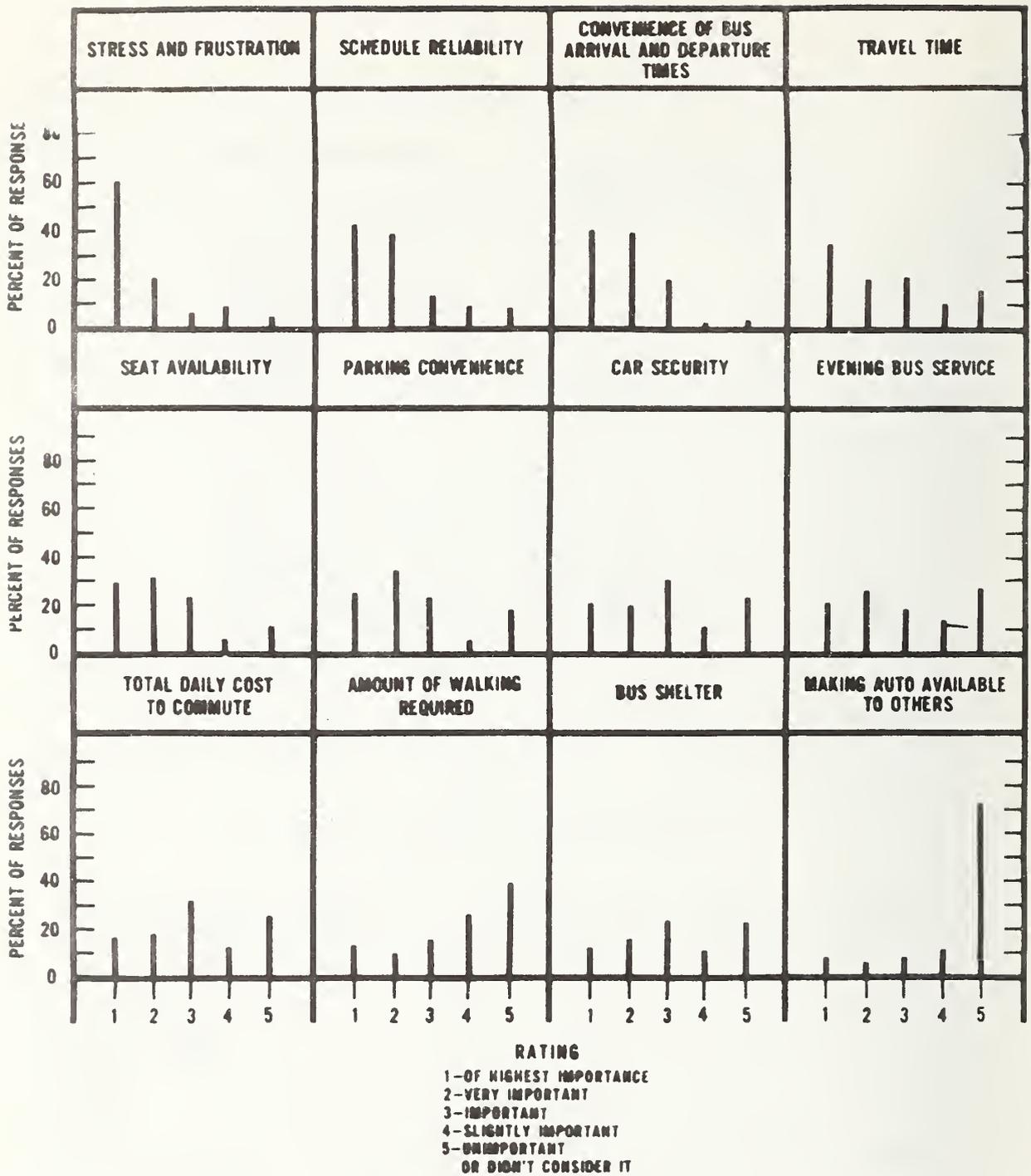


FIGURE 6. Importance Responses of Former Auto Users at Backlick

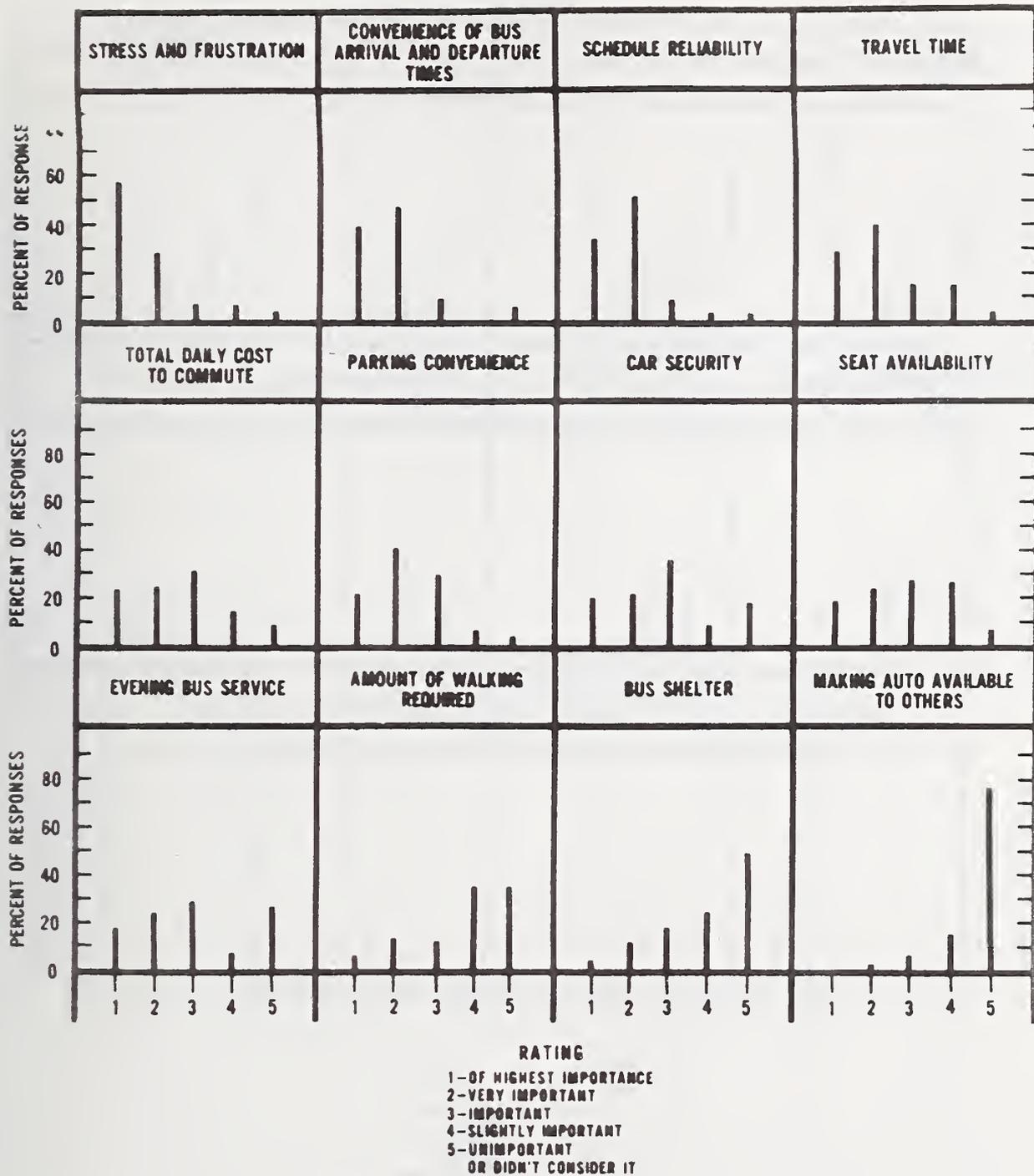


FIGURE 7. Importance Responses of Former Auto Users at Springfield Plaza

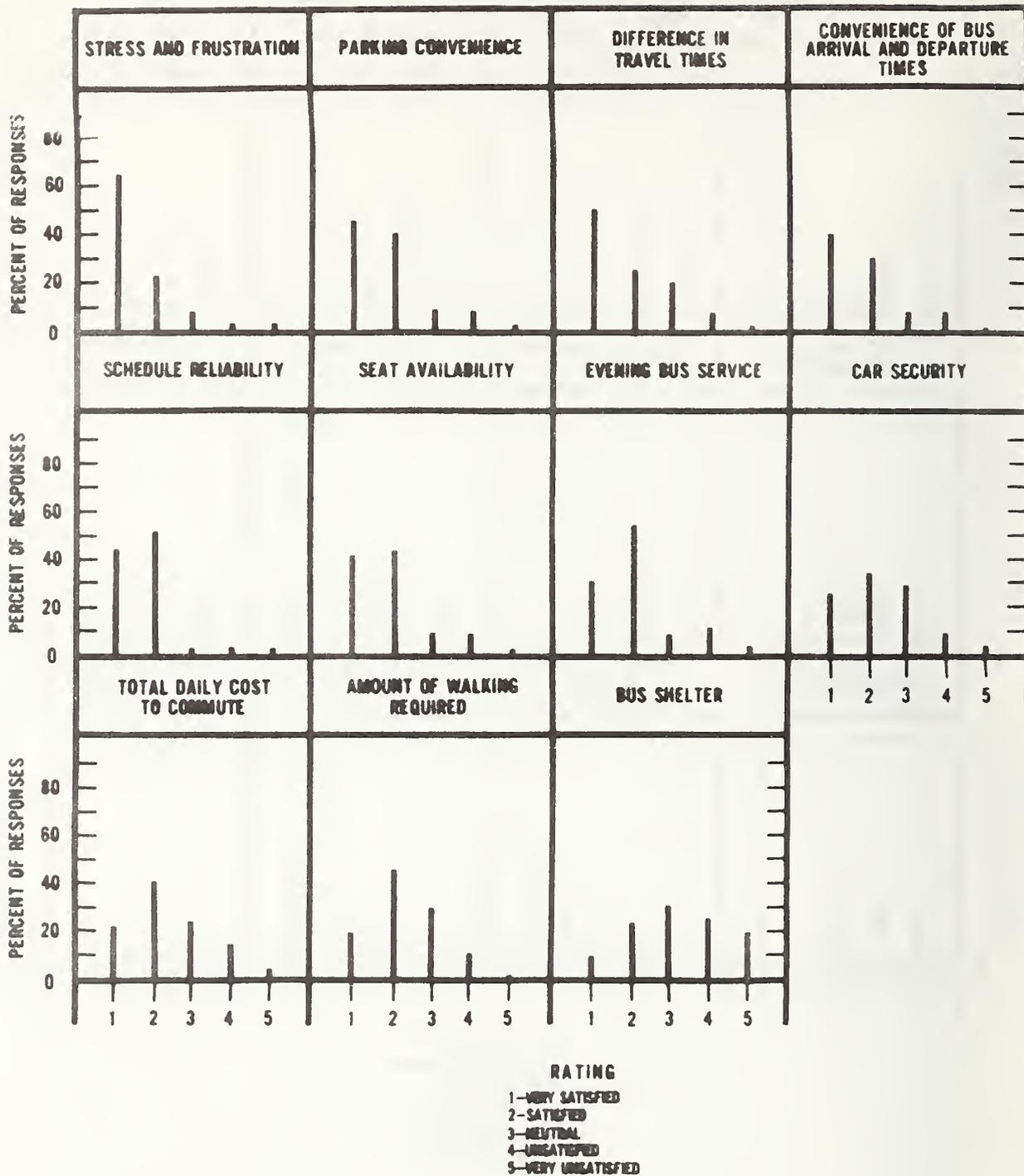


FIGURE 8. Satisfaction Responses of Former Auto Users at Backlick

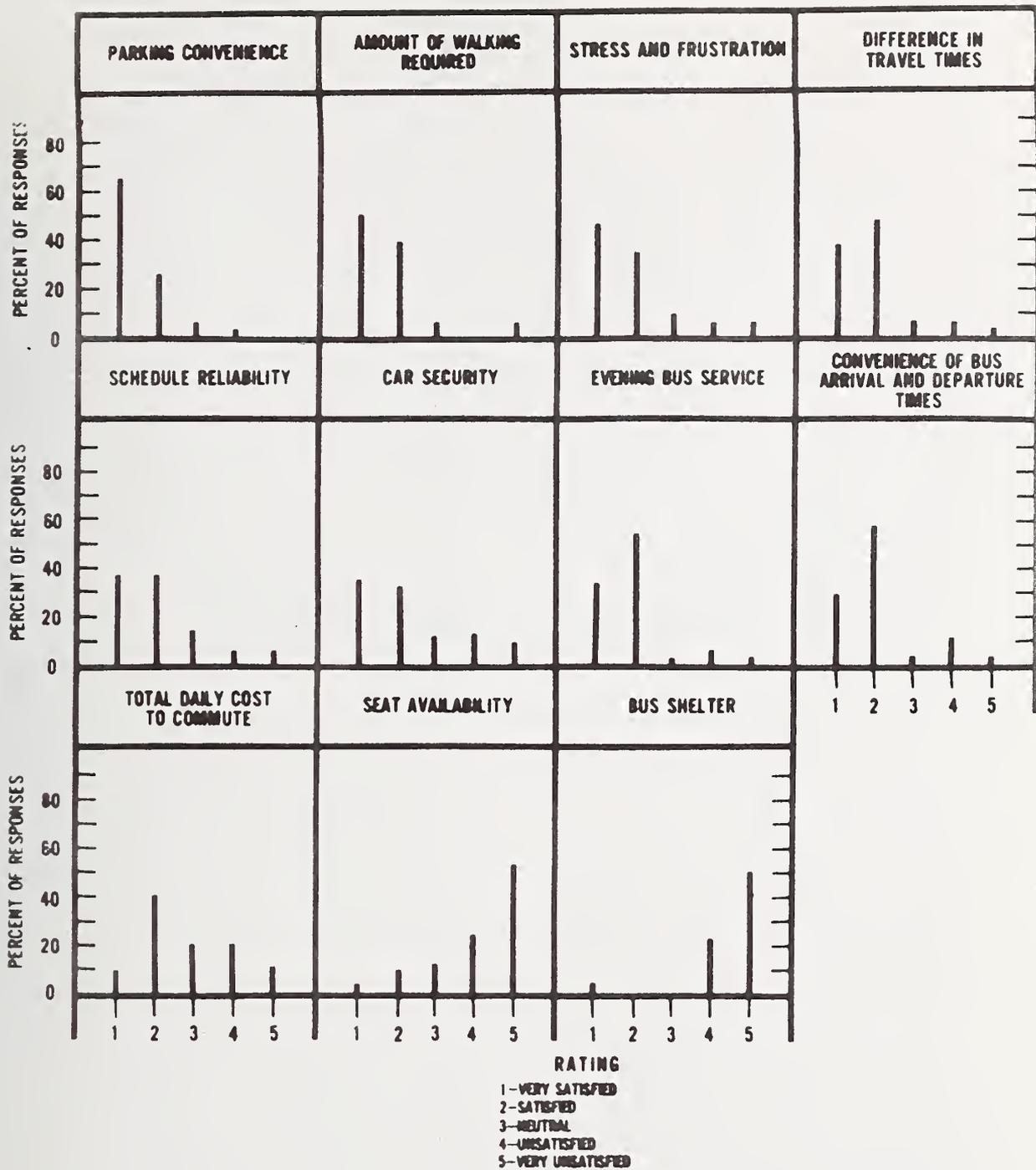


FIGURE 9. Satisfaction Responses of Former Auto Users at Springfield Plaza

APPENDIX D

Demographic Stratifications of Survey Responses of Former
Auto Users at Backlick Lot (February 1973)

Table 11

Summary of Importance Responses by Income Class

FEATURES	PARK-AND-RIDERS RESPONDING "OF HIGHEST IMPORTANCE" OR "VERY IMPORTANT" ^a					
	LESS THAN \$15,000 (15)		\$15,000- \$30,000 (66)		MORE THAN \$30,000 (16)	
	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK
Stress and Frustration	80	2	85	1	69	2
Convenience of Arrival and Departure Times	80	2	73	3	76	1
Schedule Reliability	87	1	81	2	69	2
Travel Time	54	8	50	6	69	2
Seat Availability	66	5	59	4	57	6
Parking Convenience	73	4	55	5	63	5
Evening Bus Service	54	8	41	7	44	7
Car Security	60	6	32	8	38	8
Cost	53	10	28	9	32	9
Walking Distance	34	11	18	10	13	12
Bus Shelter	60	6	14	11	27	10
Auto Availability	14	12	10	12	19	11

(.) Number of Responses

^aThe feature with the highest percentage of "very important" and "of highest importance" responses is ranked number one (1).

Table 12

Summary of Importance Responses by Age and Sex

FEATURES	PARK-AND-RIDERS RESPONDING "OF HIGHEST IMPORTANCE" OR "VERY IMPORTANT" ^a						
	AGE CATEGORY			SEX CATEGORY			
	UNDER 40 YEARS (53) PERCENT	RANK	OVER 40 YEARS (47) PERCENT	MALE (73) PERCENT	RANK	FEMALE (11) PERCENT	RANK
Stress and Frustration	78	1	87	81	1	84	1
Convenience of Arrival and Departure Times	76	3	78	75	3	84	1
Schedule Reliability	78	1	83	80	2	79	3
Travel Time	59	4	51	53	5	59	5
Seat Availability	48	6	72	61	4	59	5
Parking Convenience	53	5	62	53	5	75	4
Evening Bus Service	46	7	41	35	7	60	8
Car Security	31	9	47	32	8	63	7
Cost	36	8	30	30	9	42	9
Walking Distance	13	11	28	16	11	29	11
Bus Shelter	16	10	34	19	10	43	10
Auto Availability	6	12	18	11	12	13	12

(.) Number of Responses

^aThe feature with the largest number of "very important" and "of highest importance" responses is ranked number one (1).

Table 13

Summary of Satisfaction Responses by Income Class

FEATURES	PARK- AND- RIDERS RESPONDING "VERY SATISFIED" OR "SATISFIED"					
	INCOME CATEGORY					
	LESS THAN \$15,000(15)		\$15,000- \$30,000(66)		MORE THAN \$30,000(16)	
	PERCENT	RANK	PERCENT	RANK	PERCENT	RANK
Stress and Frustration	93	2	91	2	87	4
Convenience of Arrival and Departure Times	83	6	86	3	88	2
Schedule Reliability	93	2	95	1	94	1
Travel Time	60	9	78	7	76	6
Seat Availability	94	1	85	4	76	6
Parking Convenience	78	8	84	5	88	2
Evening Bus Service	93	2	80	6	75	8
Car Security	47	10	55	10	87	4
Cost	86	5	59	8	56	9
Walking Distance	80	7	59	6	50	10
Bus Shelter	40	11	27	11	31	11

(.) Number of Responses

^aThe feature with the highest percentage of "very satisfied" and "satisfied" responses is ranked number one (1).

Table 14
Summary of Satisfaction Responses by Age and Sex

FEATURES	PARK-AND-RIDERS RESPONDING "VERY SATISFIED" OR "SATISFIED" ^a			
	AGE CATEGORY		SEX CATEGORY	
	UNDER 40 YEARS (53) PERCENT RANK	OVER 40 YEARS (47) PERCENT RANK	MALE (73) PERCENT RANK	FEMALE (24) PERCENT RANK
Stress and Frustration	88 2	91 2	92 2	83 5
Convenience of Arrival and Departure Times	87 3	81 5	82 4	92 2
Schedule Reliability	95 1	96 1	94 1	96 1
Travel Time	67 2	80 2	74 7	71 7
Seat Availability	80 5	88 3	85 3	79 6
Parking Convenience	87 3	81 5	80 5	92 2
Evening Bus Service	79 6	85 4	80 5	84 4
Car Security	63 9	56 7	55 9	71 7
Cost	65 8	55 8	56 8	71 7
Walking Distance	57 10	61 8	68 8	59 10
Bus Shelter	35 11	23 11	25 11	34 11

(.) Number of Responses

^aThe feature with the highest percentage of "very satisfied" and "satisfied" responses is ranked number one (1).

APPENDIX E

Summary of Responses from the March 1973 Park-and-Ride Survey

Table 15
 Summary of Importance Responses from Second Park-and-Ride Survey (March 1973)

FEATURES	PARK-AND-RIDERS RESPONDING "OF HIGHEST IMPORTANCE" OR "VERY IMPORTANT" ^a			
	BACKLICK LOT		SPRINGFIELD LOT	
	FORMER AUTO USERS (31) PERCENT	RANK	FORMER BUS USERS (69) PERCENT	RANK
Making auto available to others	10	12	--	--
Availability of evening bus service	49	7	39	8
Security of this parking lot	34	9	43	7
Shelter at bus boarding point	13	11	19	10
Difference in total daily commuting cost	35	8	26	9
Difference in door-to-door travel time	53	5	54	6
Parking convenience	65	4	70	5
Difference in the level of stress and frustration of commuting	70	3	76	4
Seat availability	50	6	81	3
Difference in required walking	17	10	17	11
Schedule reliability	87	2	89	2
Convenience of bus arrival and departure times	93	1	91	1

(.) Number of Responses

^aThe feature with the largest percentage of "very important" and "of highest importance" responses is ranked number one (1).

Table 16

Summary of Satisfaction Responses from Second Park-and-Ride Survey (March 1973)

FEATURES	PARK-AND-RIDERS RESPONDING "VERY SATISFIED" OR "SATISFIED" ^a			
	BACKLICK LOT FORMER AUTO USERS (31) PERCENT	RANK	SPRINGFIELD LOT FORMER BUS USERS (69) PERCENT	RANK
Shelter at bus boarding point	57	1	9	11
Amount of walking required	79	9	85	6
Availability of evening bus service	97	3	84	7
Level of stress and frustration of commuting	97	3	88	5
Total daily commuting cost	60	10	47	10
Seat availability	87	6	96	2
Convenience of bus arrival and departure times	97	3	91	4
Bus schedule reliability	100	1	100	1
Door-to-door travel time	84	8	76	8
Security of this parking lot	87	6	72	9
Parking convenience	100	1	91	3

(.) Number of Responses

^aThe feature with the largest percentage of "very satisfied" and "satisfied" responses is ranked number one (1).

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